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EXAMINER

ZIMMER, ANTHONY J

ART UNIT

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1793

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|-----------------------------------|--|
| Office Action Summary | Application No. 10/534,685 | Applicant(s) SHI ET AL. | |
| | Examiner ANTHONY J. ZIMMER | Art Unit 1793 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/12/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4-5, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Madgavkar '048.

In regard to claims 1 and 5, Madgavkar teaches a catalyst system (note that the phrase “for rapid startup of an autothermal reformer” does not impart patentable distinction as it is a recitation of intended use) having two different catalysts in different catalyst zones (portions); the first catalyst zone (the upstream portion) consisting of a first catalyst with a lower lightoff temperature (higher amount of platinum); and the second catalyst zone consists of a second catalyst with a higher lightoff temperature (less platinum). See column 2, lines 27-55. Example 5 utilizes such a catalyst system, wherein the first zone has a platinum content of 0.5% and the second 0.3%. Example 4 characterizes these different catalysts as having a 50°C difference in lightoff temperature.

In regard to claim 4, Madgavkar teaches both catalyst portions comprising a mixture of a low-lightoff temperature catalyst platinum and a high-lightoff temperature catalyst, mullite, (see Example 5) wherein the first portion has a higher percentage of

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the low-lightoff temperature catalyst (platinum) than the second portion as discussed above.

In regard to claim 9, Madgavkar teaches providing the catalyst system as discussed above, flowing preheated nitrogen and air over the catalyst, and introducing preheated hydrocarbon into the catalyst and allowing combustion to proceed. See column 7, lines 15-21. This process comprises both heating the first catalyst to the first lightoff temperature (whether or not this temperature was reached using the heat from the preheated nitrogen/air, the preheated hydrocarbon/air, or heat of combustion) and flowing a mixture of air and fuel over the heated catalyst to create heat by reaction of the air and fuel.

Claims 1, 3, and 5-9 rejected under 35 U.S.C. 102(b) as being anticipated by Le Gal '737.

In regard to claims 1, 3, and 5-8, Le Gal teaches a catalyst system comprising two catalyst portions (monoliths; See Figures) the first monolith containing palladium oxide (see column 4, lines 40-47) having a lightoff temperature of $\sim 700^{\circ}\text{C}$ and the second monolith having a hexa-aluminate catalyst which has a self ignition (lightoff) temperature of 1000°C (a 300°C difference). See column 5, lines 44-58. Le Gal teaches the two monoliths in the same housing. See Figures.

In regard to claim 9, Le Gal teaches providing the catalysts as required (see above), and introducing preheated fuel and air over the catalyst which reacts to heat the catalyst to at least the first lightoff temperature, after this the fuel and air flow is

continued and thus the fuel/air is flowing over the heated first catalyst portion to create heat by reaction of the air and fuel.

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 5-10, and 12 are rejected under 35 U.S.C. 102(a or e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Borup '204.

In regard to claims 1, 3, and 5-8, Borup teaches a catalyst system for an autothermal reformer comprising a first, upstream portion containing a first catalyst (a partial oxidation or POX catalyst) and a second, downstream portion having a second catalyst (a steam reforming or SR catalyst). See Figure 2, elements 190 and 192 and

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supporting text. The lightoff temperatures of both catalysts are not indicated. However, the lightoff temperatures necessarily fall into the broad ranges required by the claim(s) as the first (POX) catalyst comprises a significantly greater portion of platinum than the second reforming catalyst (as increased platinum is known to lower the lightoff temperature; see for instance evidentiary document US4378048, Example 4); and thus the lightoff temperature of the first catalyst would be lower than that of the second catalyst and would fall within the broad range required by the claim(s). See column 8, lines 26-38 and column 9, lines 30-43.

In regard to claims 9-10 and 12, Borup teaches a method for rapid startup of an autothermal reforming reaction including providing the catalyst as discussed above, heating at least the first catalyst (with a lean operation) to the first lightoff temperature, followed by flowing a mixture of air, fuel, and steam over the heated catalyst portion to produce heat by reaction of the fuel and air. See column 7, line 50- column 8, line 57 and column 3, line 67 – column 4, line 3.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 2-3 and 6-8 rejected under 35 U.S.C. 103(a) as being unpatentable over Madgavkar.

See the 102 rejection above for the limitations of claim 1.

In regard to claims 2-3, Madgavkar is silent in regard to the housing of the catalyst. However, determination of the location/configuration of a catalyst within a production apparatus is a matter of design choice and routine optimization that depends on space considerations, equipment size requirements, and other design factors and fails to produce an unexpected result.

In regard to claims 6-8, Madgavkar does not teach an example having a difference in lightoff temperatures; however, Madgavkar does teach that the concentration of the lower lightoff component (platinum) affects the lightoff temperature, see Example 4, and also teaches a difference in platinum composition between the catalyst of the first zone and that of the second that would produce a lightoff temperature difference in the broad range of the claim. See claim 1. [For instance a difference of 0.2% platinum (a ratio of platinum in the first to the platinum in the second catalyst of 1.67) produces a 50°C difference in lightoff temperature; and Madgavkar

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teaches a ratio of up to 20] Overlapping ranges are *prima facie* obviousness. See MPEP 2144.05.

Claims 2, 4, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Borup.

In regard to claim 2, Borup does not teach providing the catalysts in separate housings. However, determination of the location/configuration of a catalyst within a production apparatus is a matter of design choice and routine optimization that depends on space considerations, equipment size requirements, and other design factors and fails to produce an unexpected result.

In regard to claim 4, Borup suggests using a graded bed, i.e. wherein the first catalyst comprises a mixture having more of the lower lightoff component and less of the higher lightoff component and wherein the second catalyst comprises a mixture having more of the higher lightoff component and less of the lower lightoff component. See column 8, lines 26-38. Thus, it would have been obvious to one of ordinary skill in the art to use such a graded bed in order to affect the predictable result of performing the reforming process.

In regard to claim 11, Borup does not teach adding steam before the first catalyst portion has reached the lightoff temperature. However, Borup does teach both steps of heating the catalyst to the lightoff temperature and adding steam (see 102 rejection above), and selection of any order of performing process steps is *prima facie* obviousness. See MPEP 2144.04.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Le Gal.

See the 102 rejection above for the limitations of claim 1.

Le Gal fails to teach providing the catalyst portions in separate housings.

However, determination of the location/configuration of a catalyst within a production apparatus is a matter of design choice and routine optimization that depends on space considerations, equipment size requirements, and other design factors and fails to produce an unexpected result.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sanger '698 teaches a catalyst system comprising catalysts with different lightoff temperatures, see Figure 1 and associated text.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J. ZIMMER whose telephone number is (571)270-3591. The examiner can normally be reached on Monday - Friday 7:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ajz

/Steven Bos/
Primary Examiner, Art Unit 1793